Effective Implementation of Regional Transport Strategy: traffic incident management case study

P Charles
Centre for Transport Strategy, University of Queensland, Brisbane Australia

Abstract

Implementing regional transport strategies, plans and policy programs has proven to be easier 'said' than 'done'. A number of policy implementation frameworks have been discussed in the literature, such as Hogwood and Gunn [1], which can be used to evaluate good practice in the implementation of urban transport policy instruments. In the face of the growing challenge of addressing road traffic congestion, incident management has become an increasingly important strategy in urban areas to enable better use of the existing road infrastructure for cars, buses and trucks. Traffic incident management seeks to reduce the impact of non-recurrent events in reducing road capacity at critical locations and times, which result in costly delays, secondary incidents and increased vehicle emissions. This paper aims to analyse the implementation of traffic incident management in the Brisbane metropolitan region using theoretical policy implementation frameworks and following on from the paper by Ison and Rye [2] to identify the key success factors for effective implementation of regional traffic incident management.

Keywords: transport strategy, policy implementation, traffic incident management

1. Introduction

The European Conference of Ministers of Transport (ECMT) [3] stated, "implementing integrated policy packages for sustainable urban travel has proven easier said than done". Effective implementation of transport strategy is

not easy. This paper seeks to draw out lessons from the analysis of a case study using a theoretical framework, following on from the Ison and Rye [2] paper.

The case study analyses a multi-agency transport strategy in the Brisbane metropolitan region aimed at reducing traffic congestion due to traffic incidents. Key success factors for effective implementation of regional traffic incident management are identified to aid ongoing improvement and wider application.

In the face of the growing challenge of addressing road traffic congestion, incident management has become an increasingly important strategy in urban areas, to enable better use of the existing road infrastructure, for cars, buses and trucks. Traffic incident management seeks to reduce the impact of non-recurrent events in reducing road capacity at critical locations and times, which result in costly delays, secondary incidents and increased vehicle emissions.

Brisbane, the capital city of the Australian state of Queensland has a population of about 1.7 million people in the greater metropolitan area. Based on current trends, population growth of 40% is expected over the next twenty years. Traffic and congestion are expected to grow in line with population growth.

Many of the highly trafficked roads within Brisbane are currently operating at or close to capacity for periods longer than five hours per day. As a result, over the past five years the number of major traffic incidents that close down major urban arterial roads (including any of the limited river crossings) for hours at a time, has been increasing.

2. Implementation Theory

A number of policy implementation frameworks have been prescribed in the literature over the past 30 years, which can be used to evaluate good practice in the implementation of urban transport policy instruments. Ison and Rye [2] outline various approaches to policy implementation analysis, including analysis of failure, top-down or rational and bottom-up approaches.

In this paper the focus is on the top-down approaches, such as Hogwood and Gunn [1] and Sabatier & Mazmanian [4]. More recently the ECMT [3] made a series of recommendations for national governments for successful implementation of sustainable urban transport policies. Recent research has led to renewed interest in these frameworks, as discussed in Ison and Rye [2] who analysed travel plans and road user charging in the UK using Gunn's framework. While these may be considered dated in today's complex transport policy environment, they provide a useful analysis framework.

A combined good practice implementation framework outlined in Table 1 has been compiled from these approaches and are grouped under the following aspects: context, resourcing, theory, leadership, clarity, coordination, compliance, support and monitoring. This framework provides a useful structure for a case study analysing the implementation of a regional transport strategy or policy.

Table 1: Theoretical Policy Implementation Framework

Context: external circumstances	Circumstances external to the implementing agency do not impose crippling constraints [HG]; Relative priority of objectives not undermined over time [SM]; Political stability [IR]
Resourcing: time, skills, funds	Adequate time and sufficient resources are made available; & required combination of resources is actually available [HG]; Leaders of implementing agencies possess significant managerial and political skills [SM]; Rationalise financing and investment streams: allocate funding in a balanced way [ECMT]; Program timing [IR]
Theory: cause and effect	Policy based upon a valid theory of cause and effect; & Relationship between cause and effect is direct [HG]; Program based on sound theory [SM]
Leadership: governance, institutions	Single implementing agency [HG]; Provide a supportive legal and regulatory framework: ensure the rules and regulations clearly specify roles [ECMT]; Policy champion dedicated to the task of implementation [IR]
Clarity: clear policy and strategy	Complete understanding of, and agreement upon, the objectives to be achieved, and that these conditions persist throughout the implementation process; & tasks are fully specified in correct sequence [HG]; Policy contains unambiguous directives and structure the implementation process to maximise success [SM2]; Establish a supporting policy framework [ECMT]
Coordination: good communication and coordination	Perfect communication and co-ordination, between the various elements or agencies involved [HG]; Improve institutional coordination and cooperation: with responsibilities commensurate with resources for implementation to occur [ECMT]; flexible and open attitude toward public reaction [IR]
Compliance: require and obtain compliance	Those in authority can demand and obtain perfect compliance [HG]
Support: stakeholder support	Program is actively supported by constituency groups [SM]; Encourage effective participation, partnerships and communication [ECMT]; Public trust and support [IR]
Monitoring: data collection and monitoring	Improve data collection, monitoring and research: carry out consistent monitoring [ECMT]; Monitoring outcomes [IR]

Note: HG refers to Hogwood and Gunn [1]; IR refers to Ison & Rye [2]; ECMT refers to ECMT [3]; SM refers to Sabatier and Mazmanian [4]

3. Traffic Incident Management

Within major urban areas, traffic congestion has significant adverse economic, social and environmental impacts. One of the major causes of congestion are traffic incidents – the UK Highways Agency [5] suggests traffic incidents account for 25% of congestion the trunk road network, while in the United States Shrank & Lomax [6] estimate incidents cause somewhere between 52 and 58 percent of total delay experienced by motorists.

As traffic volumes continue to increase and infrastructure provision cannot keep up, managing traffic is becoming an increasing priority of transport agencies. A key means of reducing congestion and improving safety is the rapid response and clearance of traffic incidents – traffic incident management.

Traffic incident management is defined as the systematic, planned and coordinated use of human, institutional and technology resources to reduce the duration and impact of incidents and to get traffic moving again as soon as possible and to ensure the safety of motorists, incident victims and responders. These resources are used to systematically reduce the time to detect and verify the occurrence of an incident, implement the appropriate response, investigate and safely clear an incident, while managing the affected traffic through and around the scene until full capacity is restored.

Regional incident management has been progressively introduced in the Brisbane area over the past six years. The main agencies involved are the state Main Roads Department, Queensland Police Service and the local authority, Brisbane City Council. Police are the responsible agency for incident scenes. A Memorandum of Understanding was formalised between these agencies in late 2002, outlining objectives, governance arrangements, roles and responsibilities and management processes. The Brisbane Incident Management Coordination Group was established in 2002 comprising key stakeholders in incident management. The Group currently meets monthly to coordinate implementation, exchange information and conduct joint planning and training exercises.

There is widespread deployment of intelligent transport systems in Brisbane to manage traffic, including traffic incidents. Sophisticated traffic management systems are extensively deployed across the region. Video cameras are being progressively deployed along the major traffic routes, with coverage of most of the inner city area. Variable message signs have only been deployed on some of the major traffic routes, with radio broadcasts and web sites being used to provide information on traffic incidents to road users. Call centres and traffic hotline numbers are used as a primary means of incident detection through mobile phone calls and roadside emergency telephones are installed on the freeways. Service patrols have been deployed, using specially designed and purpose built Traffic Response Units and towing contractors.

There are more than 2,500 incidents in the Brisbane area each year, half of which are minor or non-injury, taking in excess of 2,000 hours to clear.

4. Implementation of Traffic Incident Management

This section reviews the implementation of regional traffic incident management in relation to the nine components in the theoretical framework in Table 1.

4.1 Context

Experience in Brisbane is that traffic incidents that cause gridlock of a significant part of the network for long periods during critical peak time generate considerable media and community attention and political interest. A perception of poor performance by responder agencies can result in political 'quick fix' actions, subverting effective implementation.

Incident management programs respond to congestion due to incidents, especially a significant incident or incidents that captures community, media and political attention, where a significant part of the road network is closed down during the peak period, resulting in considerable delays.

Traffic incidents can result in 'positive' external circumstances. When a problem becomes big enough or reaches crisis level, then politicians are keen to allocate resources and give priority to solving the problem. With expected traffic growth and lagging infrastructure provision, increasing pressure is expected on getting effective incident response and clearance. The relative priority over time will therefore tend to increase, irrespective of changes in politics.

This makes it imperative that good planning and effective coordination and communication processes are in place and 'at the ready'. It is also important that emerging trends and developments are monitored and regular reviews of current performance undertaken.

The difficulty with most traffic incidents is that they are unpredictable. Traffic impacts of special events (sporting, road works etc) can be planned for.

Successful traffic incident management programs need to be able to respond to the expected increasing pressures from the external environment, rather than be concerned about the constraints.

4.2 Resourcing

One of the major challenges facing agencies implementing best practice traffic incident management programs is limited resources (funding and skilled people) and a lack of data, making it difficult to provide robust business cases.

Incident management programs are part of other programs in the agencies in Brisbane. Consequently they suffer from insufficient and uneven resourcing across agencies. All agencies have multiple responsibilities; hence competing priorities can affect resources actually available when response to an incident is required. There are the ongoing operational responsibilities across the whole region, across all areas of responsibility for Police, traffic agencies and emergency responders that compete for their attention. Development of procedures and coordinated approaches also takes time to develop and embed in organisations.

In recent research conducted by the author, it was found that all incident response agencies do not have dedicated funding programs and suffered from insufficient resources to effectively undertake base level response services. It has been difficult to deploy basic infrastructure, such as cameras to monitor traffic, variable message signs to provide road user information, and communication links between agency control centres. A number of services are being provided during peak traffic periods, across parts of the network, including police motorcycle rapid response units, towing contractors and traffic response units for minor incidents. But much more can be and should be done.

Appropriate levels of knowledge and understanding, at senior and middle levels in responder organisations, is key to effective implementation. It is difficult to persuade decision makers to allocate funds if they do not understand, or cannot be shown hard evidence of the benefits.

Funding allocation processes make it difficult to build a business case for because there is limited information available on the impacts or benefits of incident management programs, considering the complex interactions of traffic management interventions.

Undertaking evaluation of the benefits of incident management programs, as well as developing alternative evaluation processes to assess the feasibility of proposals, such as multi-criteria approaches is needed to address these issues.

4.3 Theory

It is intuitive that quick response to clear incidents reduces their impact, ie reduces congestion delays, improves safety and reduces emissions, and is worthy of investment of public funds, which provides benefits to the community. However there is little quantified evidence for Brisbane. Thus it becomes difficult to convince senior management in responder agencies to allocate sufficient funds without a well-argued business case.

The relationship between cause and effect is very direct for TIM programs – clearing traffic incidents has a direct and immediate effect on congestion, safety and delay and there are no complex cause and effect linkages to provide barriers to implementation.

4.4 Leadership

Leadership in incident management means developing and maintaining a priority for incident management, in the face of increasing congestion challenges and resource constraints. It requires a multi-agency approach, which is contrary to Hogwood and Gunn's [1] 'single implementing agency' principle.

This has been addressed through a range of initiatives including a formal agreement, demonstration projects and establishing an inter-agency forum.

In Brisbane it was determined in the early stages that successful incident management programs must have a regional perspective, because incidents have a regional impact and can only be effectively addressed through an inter-agency and inter-jurisdictional approach. The approach taken was to start with a minimum number of critical responsible agencies, in this case Police and the

state and local road transport agencies. This coalition is being expanded to other key agencies and organisations.

Establishing the inter-agency forum, the Brisbane Incident Management Coordination Group, has been critical to maintaining interest and enthusiasm, with regular discussions on policy and technology issues and agreement on coordinated action. Fortunately a senior Police officer chairs the Group, which has positively influenced commitment from other responder agencies, providing a champion role.

Having an agreed governance structure is also important, in Brisbane's case a high level strategic committee was established comprising top management of the critical responsible agencies, under the Memorandum of Understanding, to meet only a few times per year and receive reports on achievements and performance and consider matters requiring high level decisions, such as changes to the legislation and policy.

Agreement has been reached on responsibilities for all aspects of incident management, including who is in overall command of an incident and which agency is responsible for what. To achieve this requires all agencies to be aware of the capability and responsibilities of other agencies and making staff aware of the agreements on roles and responsibilities.

One of the challenges is to provide a supportive regulatory environment, particularly in relation to quick clearance policies, which allow blocking vehicles to be rapidly removed from the roadway. There are also boundary issues, such as Police districts or local government areas and there have been instances when response to a major incident was less effective because of cross boundary issues.

4.5 Clarity

A clear policy position, with an agreed strategic direction based on key stakeholder consensus, is needed for effective implementation; otherwise there will be inefficient use of resources and result in people losing interest.

Such a strategy needs to contain agreed objectives, strategies, roles and responsibilities and performance criteria, so that each participant has realistic expectations of others and agree on their own obligations and commitments.

Attempts have been made to develop an incident management strategic framework, but it has yet to be formalised. Different stakeholders have different charters, eg police and emergency services are charged with public safety, while transport agencies are about moving people and goods (moving traffic), so an agreed strategy needs to balance and align these often competing objectives. It is also important to agree on measures of performance to evaluate incident management programs on a regular basis.

Procedures, tasks and sequences are generally defined by each agency, but not agreed in detail between the various agencies – an area for improvement.

4.6 Coordination

Protocols for the control of the incident site have been agreed with the inner cordon, or immediate incident scene, being managed by Police (or the Fire agency in the case if a fire) and managing traffic through and around incident

scene, or the outer cordon, being managed by the relevant road traffic agency. Coordination between control centres is also reasonably effective.

Diversion plans and principles for diverting traffic in major traffic corridors are progressively being developed and agreed and processes for special events are well developed.

The Brisbane Incident Management Coordination Group provides an excellent mechanism to regularly review policy and plans and review performance, as well as progress implementation.

Inter-agency communication is generally well done with a high level of cooperation, however provision of information to the public is not well coordinated.

4.7 Compliance

It is difficult to consider compliance in the case of Brisbane's incident management program without a formal policy or strategy in place or dedicated resourcing. What happens is consensus and negotiated agreements – where it is much more difficult to enforce compliance.

4.8 Support

There are few constituency groups involved, however the UQ Centre for Transport Strategy provides independent expertise and knowledge, facilitates training and review processes and undertakes an advocacy role with the stakeholders. More attention is need to the promotion of the program to stakeholders, the public and government.

Greater involvement of other stakeholders, such as trucking associations, public transit, vehicle insurance and towing industry and the media, are progressively being targeted, to raise their awareness of the implications of incident management and identify their needs and potential contribution.

4.9 Monitoring

One area that has been successful is the post-review of major incidents, with responder agencies collecting and sharing of data for interpretation and analysis. Inter-agency debriefs after major traffic incidents have been very frank and open and have identified institutional and policy issues and lessons for subsequent implementation.

A benchmarking project has been initiated to identify the current position and achievements of each of the key agencies and recommend potential areas for improvement. Additionally research is being undertaken to develop an evaluation model to assess, on a network wide basis, the cost of traffic incidents and to test the effectiveness of pre-planned diversion routes and identify potential problems.

Agreed performance measures and targets need to be established and consistent and structured data collection undertaken to enable outcomes to be monitored and reported on a regular basis and improvement processes to be instituted.

5. Success Factors

From the above analysis the following success factors can be identified, which then lead to suggestions for further improvements:

- Build a coalition of key stakeholders, meeting on a regular basis, led by a respected champion to discuss policy issues, agree roles and responsibilities, facilitate implementation and review and report on outcomes
- Monitor emerging trends and developments to be in a good position to respond to pressures in the external environment
- Establish the strategic direction in terms of objectives, strategies and identify measures and targets for incident response and clearance to track performance
- Collect and analyse data on agreed performance measures and report outcomes
- Build a high level of understanding by decision makers of what can be achieved with incident management and obtain commitment from executive and/or elected official levels in key stakeholder agencies
- Develop and maintain an appropriate regulatory and legal supporting framework
- Establish formal agreements about operational and administrative procedures and policies and communications protocols
- Develop robust business case procedures and multi-criteria evaluation approaches to assess the feasibility of proposals
- Establish the evidence of the impacts and benefits of incident management by targeted research so robust funding arguments can be developed
- Develop a regional, multi-agency, multi-year incident management funding program from a combined consideration of future funding needs to deploy the highest priority infrastructure and services
- Identify and facilitate champions in stakeholder organisations at operational and senior management levels and key independent experts who can provide facilitation and independent review of activities and progress
- Build capability through education and awareness of key staff and decision makers in incident management and the community
- Undertake regular joint training exercises to allow development of working relationships and understanding of each agency's roles and responsibilities
- During major traffic incidents provide appropriate real-time traveller information to road users

Reduction in the time to clear incidents is a priority. Effective, long-term relationships among all key players need to be robust and sustained, which often involves several agencies working jointly at multiple organisational levels. The challenge of establishing and continuing these levels of cooperation should not be underestimated.

6. Conclusion

Traffic incident management is a 'work in progress' in Brisbane, with a healthy approach to monitoring, review and improvement. The theoretical implementation framework in Table 1, based on approaches outlined in the literature, provides a useful, structured basis to review implementation of Brisbane regional traffic incident management program.

The success factors identified provide a valuable focus for ongoing efforts to improve implementation.

References

[1] Hogwood B W & Gunn L A, *Policy Analysis for the Real World*, Oxford University Press, 1984

[2] Ison S & Rye T, *Lessons from travel planning and road user charging for policy making: through imperfection to implementation*, Transport Policy 10, 223-233, 2003

[3] European Conference of Ministers of Transport (ECMT), *Implementing Sustainable Urban Travel Policies: Key Messages for Governments*, ECMT, Paris, 2002

[4] Sabatier P A and Mazmanian D, *The Conditions of Effective Implementation: a guide to accomplishing policy objectives*, Policy Analysis, 5, 481-504, 1979

[5] Highways Agency (HA) (2002) *Incident Management Study,* UK Highways Agency, July 2002 http://www.highways.gov.uk/aboutus/corpdocs/im/2002/index.htm

[6] Schrank D and Lomax T (2003) *The 2003 Annual Urban Mobility Report*, Texas Transportation Institute, September 2003.